Identify Pedestrian Facility Need

BACKGROUND

The *Maricopa Association of Governments Pedestrian Plan 2000* includes two tools to help assess where pedestrian facility improvements are most needed in the MAG Region and specific recommendations that would create a greater sense of pedestrian comfort. These tools were expressed as roadway design performance guidelines and quantified through the following models:

- *Pedestrian Latent Demand Model*
- *Roadside Pedestrian Conditions Model*

The models provide statistical support to what can sometimes seem intuitive. In instances where statistical support is helpful or required to justify spending on pedestrian improvements, the models can be deemed critical. However, the logarithmic models can be considered complex and are best understood by engineers that routinely perform this type of work. Other projects may be justified by using a more intuitive approach to determine priorities and degrees of pedestrian accommodations. Still others may require no justification; decision makers need only be directed to guidelines that fit their particular location and condition.

DECISION MAKING SCENARIOS

This section provides three decision making scenarios when determining pedestrian facility need.

1) When to use the models as presented in the *Pedestrian Plan 2000*

2) When to use an intuitive approach

3) When to simply make a determination of your condition, and then design accordingly

One methodology is provided for assessing project priority for Scenarios #1 and #2.

Scenario 1) When statistical verification is required to support a pedestrian improvement priority and/or a level of pedestrian accommodation:

Apply the Pedestrian Latent Demand Model and the Roadside Pedestrian Conditions Model and apply the corresponding level of pedestrian accommodation corresponding

to: ***Safety, Comfort or Destination*** *as defined in this document.*

The ***Pedestrian Latent Demand Model*** estimates potential pedestrian activity along segments of roadway corridor, based upon the frequency and proximity of adjacent trip destinations or attractors (parks, schools, employment and trailheads) and origins or generators (residential). The model uses much of the same socio-economic data as that used in motor vehicle and transit travel forecasting, but with adjustments based on specific travel characteristics of the pedestrian. It provides a tool to decisions makers on where to focus limited resources on improving pedestrian conditions.

The model assumes that there are no constraints to pedestrian travel other than distance, applying an "if you build it they will come" philosophy to determining potential pedestrian activity within an area. Both existing and future conditions were analyzed. Data inputs for the modeling analysis include the following:

- *land use, particularly the mix (if any) of residential densities, retail, office, public, quasi-public, industrial, etc.*
- *public schools and universities*
- *public parks*
- *urban trails*
- *population density*
- *income level*
- *employment values within MAG's traffic analysis zonal data*
- *age demographics*

For the future land use scenario, existing urban features were analyzed along with future population and employment projects as anticipated in MAG's 2020 land use zonal data sets.

The ***Roadside Pedestrian Conditions Model (RPC)*** assesses how well existing roadside conditions satisfy pedestrian needs, thereby creating a sense of pedestrian comfort. The outcome is stratified into a "level of service" grade from A to F, with A being the best conditions for pedestrians and F representing the worst. The model looks at roadway, traffic and pedestrian conditions and incorporates many of the pedestrian principles from the *1995 Pedestrian Policies and Design Guidelines* into its evaluation. Data inputs include:

- *lateral separation between pedestrians and motor vehicle traffic (including the presence, and width of sidewalks)*
- *amount and speed of motor vehicle traffic*
- *percentage of heavy vehicles (trucks)*
- *number of travel lanes*
- *presence of a paved shoulder, bike lane, or on-street parking*
- *width of buffer between sidewalk and roadway*
- *trees or other "protective" barriers in the buffer*

The level of service grade can be applied to both the existing and the desired roadside condition. For instance, if the existing conditions rated a C, a community could desire a grade of A, and specific improvements are recommended to achieve this higher score. Tables were provided that identified different buffer widths and tree spacing based upon the other road and traffic factors. These two factors: separation width and the barriers within that width were identified as the primary factors that can be manipulated outside the traffic zone in creating a pedestrian sense of comfort in a roadside condition.

The two models were tied to the *1995 Pedestrian Policies and Design Guidelines* in the following two ways:

1) The **Latent Demand Model** was equated to the four "area types":

- **District** = Highest latent demand (Score of 100% to 80%)= areas of high intensity with a wide variety of land uses with a regional appeal

- **Campus** = Second highest latent demand (Score of 79% to 60%) = high intensity areas with a single or limited mix of land uses
- **Community** = Third highest latent demand = areas of low to medium intensity
- **Neighborhood** = Fourth highest latent demand = areas of low intensity with a limited mix of land uses

2) The **Roadside Pedestrian Conditions Model** was equated to Pedestrian Latent Demand:

- Pedestrian **Level of Service A** = highest latent demand = **District**
- Pedestrian **Level of Service B** = second highest latent demand = **Campus**
- Pedestrian **Level of Service C** = third highest latent demand = **Community**
- Pedestrian **Level of Service D, E & F** = fourth highest latent demand = **Neighborhood**

Specific pedestrian improvements were then tied to what was recommended for each of the area types and the levels within them.

The two models which are available through MAG should be tied to the *Updated Pedestrian Policies and Design Guidelines* by running the models for a particular area and applying as follows:

- **Destination** = Highest latent demand (Score of 100% to 80%)= **Level of Service A** = areas of high intensity with a wide variety of land uses = downtowns, major university campuses, areas around large regional shopping malls, newly built "town centers"
- **Comfort** = Second highest latent demand (Score of 79% to 60%) = **Level of Service B** = high intensity areas with a single or limited mix of land uses
- **Safety** = Third highest latent demand (Score 59% or lower) = **Level of Service C, D, E or F** = areas of low to medium intensity with little to no mix of land uses

These guidelines would apply to major streets, other lower classified streets within the general area for which the model was run as well as non-vehicular corridors (latent demand application only). Recommended setback widths in the Roadside Pedestrian Condition Model will likely be greater than what is recommended in this document. Any project must consider available right-of-way width, building setback and other site specific considerations, and provide as much lateral separation as possible.

Scenario 2) Where the degree of modeling sophistication is not required to determine or justify a project priority or level of pedestrian accommodation, but the type of appropriate pedestrian improvements or priority is not clear:

Apply the intuitive approach to determine Pedestrian Latent Demand and the Roadside Pedestrian Conditions then apply the level of pedestrian accommodation corresponding to: ***Safety, Comfort or Destination*** *as defined in this document.*

When both the existing and future scenario latent demand maps are reviewed, the results are not surprising. Areas of highest population density and with the greatest mix of uses have the highest pedestrian latent demand and those areas with lowest density and single land uses have the lowest latent demand. The models quantify what seems predictable. The following process can be used to match pedestrian accommodations to an anticipated level of pedestrian activity.

The data inputs used in the formal Latent Demand Model outlined above can be simplified into matrix form to determine latent demand in the project

area. Additional characteristics have been added to reflect the expanded scope of these guidelines. The project's score is then equated to guidelines associated with safety, comfort and destination. The scoring breakdown is comparable to the percentage breakdown for the Latent Demand Model identified in the *Pedestrian Plan 2000* with an 80% of the total possible score equating to the highest latent demand, 60% -79% representing the next highest and 59% and less representing the lowest.

Intuitive Approach Latent Demand Assessment

Characteristic	Variable within the TAZ	Score
1) Land Use Mix (residential densities, retail, office, public, quasi-public, industrial, other. Agricultural and inaccessible open space not counted as a land use)	5 or more land uses	+3
	2-4 land uses	+2
	1 land use	+1
	Agricultural or inaccessible open space	+0
2) Public schools and universities	4000+ students	+3
	1500-3999 students	+2
	<1499 students	+1
	No schools	+0
3) Public facilities (libraries, city hall community centers, etc.)	3 or more facilities	+3
	2 facilities	+2
	1 facility	+1
	No facilities	+0
4) Public parks	Regional park	+3
	Community park	+2
	Neighborhood park	+1
	No parks	+0
5) Urban trails and bikeways	Regional trail or bikeway	+3
	Community trail or bikeway	+2
	Local trail or bikeway	+1
	No trails or bikeways	+0
6) Population density (dwelling units per acre)	8+ DU/AC	+3
	4-8 DU/AC	+2
	<4 DU/AC	+1
7) Income level (annual household)	<$18,600	+3
	$18,600-$42,300	+2
	$42,300 or more	+1

8) Age Demographics	Area has many young and/or many older pedestrians	+3
	Area has average numbers of young and/or older pedestrians	+2
	Area has few young and/or older pedestrians	+0
9) Bus stop	More than one	+3
	One	+2
	None	+1
10) Employment values within MAG's traffic analysis zonal data (jobs per square mile)	4,000 or more	+3
	1,500-4,000	+2
	<1,500	+1
11) Trailheads and park and ride lots	>100 parking spaces	+3
	50 to 99 parking spaces	+2
	<50 parking spaces	+1
	No trailheads or park and ride lots	+0
12) Bus or light rail transit station	Bus and light rail transit station	+3
	Bus or light rail transit station	+2
	No station	+0
13) Light rail transit stop	More than one	+3
	One	+2
	None	+0
14) Bus stop	More than one	+3
	One	+2
	None	+0
TOTAL PROJECT SCORE		____
	maximum score	42
	minimum score	3

- **Score of 29-42 = Destination** = Highest latent demand = areas of high intensity with a wide variety of land uses with = downtowns, major university campuses, areas around large regional shopping malls, newly built "town centers"
- **Score of 22-28 = Comfort** = Moderate latent demand = high intensity areas with a single or limited mix of land uses =
- **Score 3-21 = Safety** = Low latent demand = areas of low to medium intensity with little to no mix of land uses

These guidelines can apply to any pedestrian project whether along a street or non-street corridor, within MAG Traffic Analysis Zones.

Similar to Scenario #1, determination of both latent demand and current or desired roadside pedestrian condition can help determine project priorities. The following table provides an intuitive methodology for determining roadside pedestrian level of service. The data input is comparable to those used in the Roadside Pedestrian Conditions Model discussed in Scenario #1. The scoring breakdown is comparable to the percentage breakdown for the Roadside Pedestrian Conditions Model identified in the *Pedestrian Plan 2000* with a 73% of the total possible score equating to the best conditions for pedestrians and < 18% of the score representing the worst conditions for pedestrians.

Intuitive Approach Roadside Pedestrian Condition Assessment

Characteristic	Variable	Score
1) Amount of motor vehicle traffic	< 10,000Average Daily Traffic	+3
	10,000 to 17,500 ADT	+2
	17,501 to 30,000 ADT	+1
	> 30,001 ADT	+0
2) Posted speed of motor vehicle traffic	< 30 mph	+3
	30-40 mph	+2
	41-50 mph	+1
	> 55 mph	+0
3) Percentage of heavy vehicles (trucks)	< 2 %	+3
	2 – 4 %	+2
	> 4 %	+0
4) Number of travel lanes	1 lane	+3
	2-3 lanes	+2
	4 lanes	+1
	6 lanes	+0
5) Presence of a paved shoulder, bike lane, or on-street parking	Paved shoulder with parking	+3
	Paved shoulder with bike lane	+2
	Paved shoulder of min. 4' width	+1
	No paved shoulder	+0
6) Width of buffer between sidewalk and roadway	50'	+3
	11'-49'	+2
	5'-10'	+1
	< 4'	+0

7) Trees or other "protective" barriers in the buffer	<10′ on-center or continuous	+3
	11′-40′ on-center	+2
	41′-60′ on-center	+1
	> 60′ on-center	+0
	TOTAL PROJECT SCORE	____
	maximum score	21
	minimum score	0

- **Score of 16-21 = Level of Service A = Destination =** the best conditions for pedestrians
- **Score of 12-15 = Level of Service B = Comfort =** above average conditions for pedestrians
- **Score of 8-11 = Level of Service C = Safety =** average conditions for pedestrians
- **Score of 4-10 = Level of Service D = Safety =** below average conditions for pedestrians
- **Score < 4 = Level of Service F = Safety =** worst conditions for pedestrians

Level of service is not static. An assessment is only a snapshot of current conditions and records whether an area provides any level of pedestrian accommodation. A determination is left to decision makers if that Level of Service is appropriate for existing and planned conditions at the site, or if the site needs to be improved to achieve a higher level of service.

Project Prioritization in Scenarios #1 and #2

Prioritizing projects can be accomplished where needed through either the formal models or the intuitive assessments. Once a level of service and a latent demand is defined for a project, its relative priority can be decided. Pedestrian latent demand is expressed in the following table using the terminology of these updated policies and guidelines; safety, comfort and destination.

This prioritization guideline assumes that projects that have low pedestrian potential and are currently scoring a level of service A should be of a low priority. Most likely, the project area meets the minimum guidelines as defined for the safety level of pedestrian accommodation. Likewise, a high priority would be given to projects within an area of high pedestrian potential that score less than a C for level of service.

Where a project currently may score a level of service C and falls within an area of moderate pedestrian potential (comfort), there may be a desire to upgrade that area through public and private improvements to become an area of high pedestrian potential (destination). In this instance, the priority level would raise from moderate to high.

Project Prioritization

	Safety (low latent pedestrian demand)	Comfort (moderate latent pedestrian demand)	Destination (high latent pedestrian demand)
LOS A	Low Priority	Low Priority	Low Priority
LOS B	Low Priority	**Moderate Priority**	**Moderate Priority**
LOS C	**Moderate Priority**	**Moderate Priority**	**High priority**
LOS D- F	**High Priority**	**High Priority**	**High priority**

Scenario 3) When a project requires no justification and decision makers need only be directed to guidelines that fit their known location and condition:

Choose the level of pedestrian accommodation corresponding to: ***Safety, Comfort or Destination*** *as defined in this document.*

- **Destination** = areas of high intensity with a wide variety of land uses including downtowns, major university campuses, areas around large regional shopping malls, newly built "town centers"
- **Comfort** = high intensity areas with a single or limited mix of land uses
- **Safety** = areas of low to medium intensity with little to no mix of land uses